



NOVOstar

The multifunctional microplate reader with  
advanced liquid handling for cell signalling assays



## NOVOstar – the modular multimode reader with advanced liquid handling

The NOVOstar is a unique benchtop multifunctional microplate reader that offers the next generation in liquid handling for kinetic cell-based assays along with the flexibility and sensitivity of a high performance plate reader.

### Flexibility

The NOVOstar is a flexible and modular multifunctional plate reader with advanced liquid handling capabilities. It offers a choice of five separate reading modes and is completely modular, enabling the user to purchase only the functions needed today and easily upgrade should their needs change in the future. Functions available are:

- Fluorescence
- Luminescence (flash and glow)
- Absorbance (low UV to Vis)
- Fluorescence Polarization
- Time-Resolved Fluorescence

The NOVOstar has top/bottom reading, precise temperature control, multi-mode shaking, up to four liquid delivery events per well, premixing, and user-defined kinetic sampling rates.

Unlike a conventional microplate reader, the NOVOstar has a dual microplate carrier that allows the user to designate one as a reagent plate and the other as a measurement plate. An integrated transfer pipettor delivers compounds from the reagent plate or from one of the three reagent stations to the measurement plate allowing the user to prepare wells or start kinetic events. Using this system, up to 384 compounds can be screened in a signalling assay - virtually impossible to do using a conventional plate reader. Additionally, two on-board reagent injectors can deliver variable volumes of reagent to wells giving you a wide range of liquid handling options, combined with the measurement abilities of a conventional multifunctional microplate reader.



*Dual microplate carrier with reagent plate and measurement plate*



### High performance luminescence

The NOVOstar has been designed with two dedicated measurement systems, one for fluorescence and one for luminescence. Eliminating the need to make a choice between a dedicated fluorometer and luminometer. The NOVOstar offers exceptional luminescence performance in a single instrument package that easily fulfils Promega's stringent DLReady™ (dual luciferase validation) criteria in 96- and 384-well plate formats.

### Optimized for kinetic assays

The NOVOstar is optimized to monitor fast kinetic events, such as calcium flux. These types of assays can easily be triggered using the transfer pipettor or one of the two built-in injectors. Reagent addition and measurements can be undertaken



*Advanced liquid handling with one pipettor, two reagent injectors, and three reagent stations*

concurrently to ensure even the fastest kinetics are captured. Data can be collected at different rates within the same experiment. For example, fast kinetic flux assays typically produce the bulk of their data in the first few seconds after injection. Using the multiple kinetic window feature you can collect data during this critical time with high resolution, as fast as 50 measurement points per second. After the peak you can reduce the capture rate to 1 read every few seconds thus reducing your dataset and analysis time.



## Advanced liquid handling

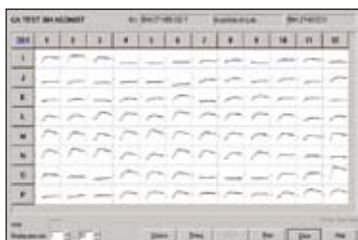
The NOVOstar includes a unique integrated transfer pipettor and two additional syringe injectors. All three liquid dispensing devices have direct access to the measurement position, allowing plate reading before, during, and after addition of liquid samples. The transfer pipettor is able to aspirate, dispense, and mix precise volumes of fluids from the reagent plate or from three reagent stations. The delivery volume is adjustable for each well from 0.5 to 100  $\mu$ L, allowing you to produce dilution schemes, concentration ranges or standard curves. The injectors can be used for adding standard reagents to selected wells in the measurement plate.

## Multichromatic detection modes

Sixteen built-in filters and fast filter switching allow sequential dual excitation/emission measurements. This feature is important for functional cellular assays using ratiometric ion indicators or voltage-sensitive FRET probes. The NOVOstar with the fluorescence polarization option can even collect data at two emission wavelengths at the same time. The simultaneous dual emission detection technology together with real-time ratio calculation substantially reduce plate read times and increase performance of FRET based assays.

## Control and evaluation software

The Windows™ based PC software provides an extensive range of options for assay design and data evaluation. Control software allows users to define instrument parameters including injection timing, mixing, shaking, pump speed, etc. During a plate measurement, the current state feature can be used to observe the progress of kinetic reactions in all wells.



*Advanced graphical display tools in the current state window*

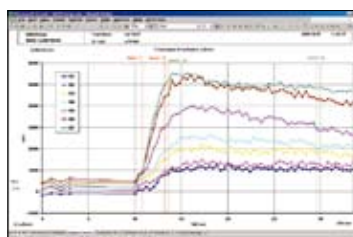
The evaluation software is based on powerful Excel™ macros. Worksheets display raw data, calculations, signal plots, and standard curves. Powerful evaluation sheets are pre-programmed to perform calculations such as %CVs, ratios, curve fitting, FP, anisotropy, dilution factors, etc. In addition, you can create your own workbooks for specific data evaluation.

## Applications

The NOVOstar is a flexible multifunctional detection platform for the most demanding assays. It is especially well suited to screen large numbers of compounds in functional kinetic cell-based assays, and its flexibility of liquid handling enables a wide range of compound concentrations to be assessed. Targeted applications for NOVOstar include measurement of calcium influx, membrane potential, and studies of other intracellular ion concentrations ( $\text{Na}^+$ ,  $\text{K}^+$ ,  $\text{Cl}^-$ , pH changes), as well as traditional biochemical assays.

### Calcium flux

Measuring intracellular calcium by fluorescent and luminescent approaches is a widely applicable method for functional screening of compounds at G protein-coupled receptors (GPCRs) and calcium channels, which represent two of the major target classes for drug discovery. Cell-permeable fluorescent dyes can be used to accurately detect any changes in intracellular  $\text{Ca}^{2+}$  on the addition of agonists or antagonist compounds. The NOVOstar's evaluation is ideal for presenting the data produced from these kinetic assays.



*Powerful macros help evaluating the measurement data*

### Membrane potential

Ion channels are an important class of therapeutic drug targets because of their critical role in nerve, cardiac, and skeletal muscle tissues. An attractive and sensitive read-out for sodium, potassium, chloride, and ligand-gated ion channels is direct sensing of membrane potential because relatively small currents can cause large voltage changes if cell resistance is high. The NOVOstar's fast measurement times and rapid sequential dual emission are used to capture these prompt changes in membrane potential.

### Biomolecular interaction assays

A major field in basic research and drug discovery is the monitoring of biomolecular interactions using highly sophisticated assays based on FRET technologies and time-resolved fluorescence. The NOVOstar offers such detection modes combined with on-board reagent injection and sequential dual emission detection for studying receptor-ligand, protein-protein, DNA-protein, and DNA-DNA interactions.

From standard quantification, reporter gene assays, to the above applications and many more, the NOVOstar delivers the ideal solution for all your microplate reader needs.

# NOVOstar - Technical Specifications

Due to the modularity of BMG LABTECH's instruments, all or combinations of the features below can be installed at purchase or upgraded at any time. Please contact your local representative for more details or a quote.

<b>Detection Modes</b>	Fluorescence Intensity - including FRET Fluorescence Polarization Luminescence (flash and glow) Time-Resolved Fluorescence - including DELFIA® UV/Vis absorbance										
<b>Measurement Modes</b>	Top and bottom reading Endpoint and Kinetic measurements Sequential Multi Excitation measurements Sequential Multi Emission measurements Simultaneous Dual Emission measurements Ratiometric measurements Well Scanning										
<b>Microplate Formats</b>	6 to 384-well plates, user-definable										
<b>Microplate Carrier</b>	Accommodates two plates: one reagent plate and one measurement plate										
<b>Light Source</b>	High energy xenon flashlamp										
<b>Detectors</b>	Side window photomultiplier tube										
<b>Optical Filters</b>	Excitation and emission filter wheels for 8 filters each										
<b>Spectral Range</b>	240 to 740 nm or 240 to 900 nm										
<b>Sensitivity</b>	<table border="1"> <tr> <td>FI</td> <td>&lt; 1 fmol / well Fluorescein</td> </tr> <tr> <td>FP</td> <td>&lt; 5 mP standard deviation at 1 nM fluorescein</td> </tr> <tr> <td>TRF</td> <td>&lt; 70 amol/well Europium</td> </tr> <tr> <td>LUM</td> <td>&lt; 30 amol/well ATP DLReady certified</td> </tr> <tr> <td>ABS</td> <td>Dynamic range: ±0.000 - 4.000 OD Reproducibility: ±0.010 OD for 0 - 2 OD range</td> </tr> </table>	FI	< 1 fmol / well Fluorescein	FP	< 5 mP standard deviation at 1 nM fluorescein	TRF	< 70 amol/well Europium	LUM	< 30 amol/well ATP DLReady certified	ABS	Dynamic range: ±0.000 - 4.000 OD Reproducibility: ±0.010 OD for 0 - 2 OD range
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ABS	Dynamic range: ±0.000 - 4.000 OD Reproducibility: ±0.010 OD for 0 - 2 OD range										
<b>Read Times</b>	Flying mode: 14 s (96), 27 (384)										
<b>Reagent Injection</b>	Up to 2 built-in reagent injectors Injection at measurement position (6 to 384-well) Individual injection volumes for each well (3 to 350 µL) Variable injection speed up to 420 µL / s Up to four injection events per well Reagent back flushing										
<b>Pipettor System</b>	Injection volume: 0.5 µl - 100 µl Individual injection volumes for each well Variable injection speed Plate-to-plate transfer + 3 reagent stations + washing station										
<b>Shaking</b>	Linear, orbital, and double-orbital with user-definable time and speed										
<b>Gas Vent</b>	System to inject an atmosphere or to pull a vacuum into the reader										
<b>Incubation</b>	+5°C above ambient up to 45°C or 60°C										
<b>Software</b>	License-free software package including Reader Control and MARS Data Analysis Software										
<b>Dimensions</b>	Width: 78 cm, depth: 53 cm, height: 30 cm; weight: 55 kg										
<b>Accessories</b>											
<b>THERMOstar</b>	Microplate Incubator and Shaker										
<b>Filters</b>	Optimized for dyes, fluorophores and specific assays Filters for all applications from UV to NIR Customized filters available upon request										
<b>Upgrades</b>	Upgrades to include options such as additional detection modes, reagent injectors, etc. are available. Please contact your local representative for more information.										

Sensitivity is calculated according to the IUPAC standard:  $3(SD_{blank})/\text{slope}$   
Specifications are subject to change without notice



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